

**AN EVALUATION OF THE FALL PROTECTION PRACTICES
AND PROCEDURES AT XYZ CONSTRUCTION, MENOMONIE, WISCONSIN**


by

Patrick Banaszynski

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A handwritten signature in black ink, reading "Elbert Sorrell". The signature is written in a cursive style with a horizontal line underneath it.

Research Advisor: Dr. Elbert Sorrell

The Graduate School
University of Wisconsin-Stout

December, 2003

The Graduate School
University of Wisconsin-Stout
Menomonie, WI 54751

ABSTRACT

	Banaszynski	Patrick	R
(Writer)	(Last Name)	(First Name)	(Middle Initial)

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The following research presents the importance of construction employees receiving proper fall protection training and supervisors conducting fall protection preplanning activities. The purpose of this research was to identify to what extent production employees at XYZ Construction are knowledgeable of and adhere to proper fall protection practices and procedures, and to determine to what extent preplanning pertaining to fall protection occurs. The level of employee compliance to fall protection

regulations associated with the company's operations were identified, followed by the determination of employee understanding of fall protection regulations and the amount of fall protection preplanning conducted on behalf of the supervisor. Major findings from the research, conclusions generated from the major findings, and recommendations for addressing the company's fall protection concerns conclude the research.

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CHAPTER ONE

Statement of the Problem

Introduction

According to Basil Tominna (2001), a Naval Facilities Engineering Command (NAVFAC) Fall Protection Engineer for the United States Navy, an interesting quote from a brochure by the International Society for Fall Protection (ISFP) states:

Gravity is unquestionably one of mankind's earliest hazards – certainly predating fire, noise, pollution, and most other hazards of modern, industrialized economies. This “gravity hazard” has always been in existence and responsible for humans falling from heights, slipping, tripping, and falling. The result is injuries, disabilities, and often death at alarming rates throughout the world.”

The ISFP further stated that, “In one year, fall related accidents account for more than 800,000 injuries and 13,000 fatalities in North America.” As a result of those injuries and fatalities, an estimated \$40 billion is spent each year to aid in the recuperation of injured workers and compensate families for the loss of loved ones (Elgun, 1999).

The gravity hazard is no more prevalent than in the construction industry, where year after year falls from heights are the single most common cause of injuries and deaths (Occupational Safety and Health Service, Department of Labour, Wellington, 1998).

According to the U. S. Bureau of Labor Statistics, 6.7 million wage and salary and 1.6 million self employed and unpaid family non-government workers were employed in the United States construction industry in 2000 (Bureau of Labor Statistics, U. S. Department of Labor, 2003). Of the 8.3 million workers employed in the United States construction industry, Occupational Safety and Health Administration (OSHA) statistics show that

typically 150-200 workers are killed and more than 100,000 injured each year as a result of falls on construction sites (Associated Builders and Contractors, 1999).

In the residential sector of the construction industry, the statistics of injuries and fatalities as a result of falls are even more shocking. Throughout the last decade, the number of fatalities in Residential Building Construction due to falls has been between 62 and 114 per year, a percentage ranging from 33% to 48% (Bureau of Labor Statistics, U. S. Department of Labor, 2003). The portion of Residential Building Construction known as Single-Family Homes Construction presents similar numbers, with fatalities due to falls between 62 to 86 each year, a percentage ranging from 35% to 45% (Bureau of Labor Statistics, U. S. Department of Labor, 2003).

The negative impacts of falls in the construction industry reach far beyond the obvious threat of death. For the more than 100,000 workers injured in the construction industry as a result of a fall who do not succumb to their demise as a result of the fall and are lucky enough to be alive, there are other negative impacts associated with falling (Associated Builders and Contractors, 1999). According to the Wisconsin Workplace Safety Institute, in Wisconsin alone, 12% of all compensable workers' compensation claims are a result of construction injuries (Wisconsin Workplace Safety Institute, 2001). This translates to millions of dollars paid to injured construction workers and their families as a result of suffering sustained due to an injury from a fall.

The threat of injury or death as a result of a fall is the most frequently encountered hazard for employees in the construction industry, particularly in Residential Building Construction. The threat of injury as a result of a fall is certainly evident for Single-Family Home Construction, including at XYZ Construction, a residential construction

company located in Menomonie, Wisconsin. Menomonie is located along Interstate 94, one hour east of Minneapolis, Minnesota and one-half hour west of Eau Claire, Wisconsin. Founded in 2002 through a buyout of the retiring former owner, the present owner employs four carpenters and constructs four to five homes per year. In addition to the construction of new homes, XYZ Construction also performs remodeling and various smaller projects.

With frequently minimal or no safety training provided to workers employed within the sector of Single-Family Home Construction, the result is an increased risk for employees to incur injuries. The lack of safety training in the Single-Family Home Construction sector includes that of fall protection practices and procedures, thus many employees are not familiar with the industry recognized and recommended acceptable safe work practices and procedures. Without a thorough understanding of the industry's recognized safe work practices and procedures, employees are unable to conform, and thus employees are at a heightened risk for incurring accidents and sustaining injuries. As a result, inadequate conformance to proper fall protection practices and procedures by production employees at XYZ Construction is placing the organization at an elevated risk of sustaining employee injuries.

Purpose of the Study

The purpose of this research was to identify to what extent production employees at XYZ Construction are knowledgeable of and adhere to proper fall protection practices and procedures, and to determine to what extent preplanning pertaining to fall protection occurs.

Goals of the Study

The goals of this research will be to:

1. Observe the fall protection practices being performed by production employees to determine the level of compliance to industry recognized safe work practices and procedures.
2. Determine the extent of familiarity by production employees with industry recognized proper fall protection practices and procedures.
3. Identify to what degree management performs pre-planning activities with regard to fall protection.

Background and Significance

According to the National Institute for Occupational Safety and Health (NIOSH), falls, previously the third leading cause of work-related death across all industries, have surpassed workplace homicide to become the second leading cause after motor vehicle crashes. In the year 2000 alone, a total of 717 workers died – nearly two per day – as a result of injuries sustained due to falls from ladders, scaffolds, buildings, or other elevations (Blosser, 2001).

Deaths due to falls from elevation are frequent in the construction industry where workers are exposed to the hazard of falling daily and falls are the leading cause of occupational death. Fatal and non-fatal falls in the construction industry are a result of unprotected roof edges, unguarded roof and floor openings, unprotected leading edges, improper use and understanding of scaffolds and ladders, and other unsafe conditions and acts performed by workers. These unsafe conditions and acts are a result of poor fall

protection planning, or the complete lack thereof, as well as employees and employers not understanding the risks and the methods with which to minimize the risk of falls.

Employees at XYZ Construction are at risk for sustaining injuries as a result of a fall on a daily basis, therefore should receive applicable training pertaining to fall prevention, as outlined in section 1926.503(a) of *The Safety and Health Regulations for Construction*. Furthermore, upon establishing how familiar the production employees at XYZ Construction are with the concepts and standards of *The Safety and Health Regulations for Construction* which pertain to fall protection, the degree to which employees abide by the fall protection regulations, and the extent to which pre-planning occurs regarding fall protection issues, the focus can turn to training the employees in the areas which they display an unsatisfactory level of comprehension and/or performance, in a company-wide effort to minimize the potential for employee injuries.

Assumptions and Limitations

This study is intended to examine the extent of familiarity, understanding, and implementation practices that production employees at XYZ Construction possess regarding OSHA recognized safe work practices and procedures pertaining to fall protection. The study will be performed with the assumption that the employees at XYZ Construction do not function poorly or exceptionally on any given day, but rather perform in a consistent manner pertaining to fall protection practices and procedures. Also taken into consideration is that people may not perform in a precisely consistent manner from day to day or situation to situation.

Definition of Terms

The following definitions are applicable to the residential construction industry and the fall protection practices and procedures of residential construction. The definitions are taken from the text of: *The Code of Federal Regulations, Part 1926: The Safety and Health Regulations for Construction*, Subpart L – Scaffolds; the *NAHB-OSHA Jobsite Safety Handbook* published by the National Association of Home Builders (NAHB) and the Occupational Safety and Health Administration (OSHA); and the OSHA website for the state of Oregon.

“Competent Person” means one who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has the authorization to take prompt corrective measures to eliminate them.

“Fall Protection” means protecting someone from falling by using some means to prevent the person from actually falling or by reducing the distance of the fall to limit physical damage.

“Residential Construction” means structures where the working environment and the construction materials, methods, and procedures employed are essentially the same as those used for typical house (single-family dwelling) and townhouse construction.

“Scaffold” means any temporary elevated platform (supported or suspended) and its supporting structure (including points of anchorage), used for supporting employees or materials or both.

CHAPTER TWO

Review of Literature

Introduction

This chapter will include fall protection loss trends and causes and situations leading to falls. Furthermore, fall protection regulations will be reviewed, as well as the types of fall protection discussed. In addition, employee training and disciplinary procedures will be examined, and the chapter concludes with a strategy for preventing falls.

Fall Protection Loss Trends

Falls from elevation is the number one way that workers die in the construction industry (Residential Report, 2000); with the residential sector of the construction industry included. While the percent of fatalities due to falls in Residential Building Construction has remained reasonably consistent between 1993 and 2001, there has been an overall increase in the number of fatalities due to falls. The number of fatalities due to falls increased from 62 in 1993 to 99 in 2001, with the lowest number of fatalities between 1998 and 2001 being 97 (Bureau of Labor Statistics, U. S. Department of Labor, 2003). Meanwhile, as the percent of fatalities due to falls in Single-Family Homes Construction has also remained moderately consistent, the number of fatalities due to falls has likewise risen from 63 in 1995 to 80 in 2001 (Bureau of Labor Statistics, U. S. Department of Labor, 2003).

At the same time as the number of fatalities due to falls was rising over the past years, concurrently the population employed in residential building construction was also increasing. Residential building construction employed 560.8 million workers in 1993

and increased to 798.4 million in 2000 until the number dropped to 753.4 million workers in 2001 (Bureau of Labor Statistics, U.S. Department of Labor, 2003). While this increase in workers in residential building construction mirrors the general increase in fatalities in residential building construction from 1993 to 2001, the overall dilemma of falls in residential building construction (and the construction industry in general) resulting in injuries and death remains an area of concern.

Causes and Situations Leading to Falls

Seldom is a fall the result of a single cause, but rather falls are the result of multiple causes. However, all reasons for falls may be categorized into two main subgroups: substandard practices and substandard conditions. Substandard practices are the actions people perform that are inferior to the recognized level of competence with which the act should be performed, while substandard conditions are the unsatisfactory situations within our environment which pose an increased potential for harm. In the book, *Techniques of Safety Management*, Principle 1 states, “An unsafe act (substandard practice), an unsafe (substandard) condition, and an accident are all symptoms of something wrong in the management system” (Petersen, 1989). The principle is focused on the concept that substandard practices, substandard conditions, and accidents occur as a result of mediocre management policies, a second-rate employee and supervisor selection process, inadequate training, and lack of proper supervision. On a positive note, substandard practices, substandard conditions, and accidents may be prevented through developing safe work procedures and training workers regarding those procedures. The following paragraphs discuss some scientific and non-scientific reasons as to why people fall.

In a Construction Bulletin released in 1998 by the Occupational Safety & Health Service, it states that most falls are preventable providing common sense is used and people think about what they are doing (Occupational Safety & Health Service, Department of Labour, Wellington, 1998). While this statement may or may not be true, an important thought to keep in mind concerning common sense is that each person's level of common sense varies as a result of diverse backgrounds and experiences. What is common sense to one person may not necessarily be common sense to another person.

While levels of common sense inevitably vary from one person to the next, all people have automatic systems within the body which maintain balance through the body's center of gravity line which falls between the position of the feet (Occupational Safety & Health Service, Department of Labour, Wellington, 1998). The body's center of gravity is normally concentrated near the hips and maintained by the feet being positioned firmly on the surface beneath them. However, a fall may still occur if the body's center of gravity travels too far from this point of equilibrium, causing loss of balance.

Regardless of whether a person falls as a result of a generic concept such as the lack of common sense or as a consequence of a scientific phenomenon pertaining to the body's center of gravity, there are common situations which lead to falls. In a Construction Toolbox Talk developed by NewGround Construction Safety (2000) regarding falls, NewGround stated the five most common reasons for falls in construction as:

- Poor housekeeping;
- Tripping hazards caused by uneven surfaces;

- Poor lighting;
- Weather (rain, snow, ice, and mud); and
- Failing to look where you are stepping

(NewGround Construction Safety, 2000).

The Construction Bulletin released in 1998 by the Occupational Safety & Health Service, Department of Labour, Wellington, goes into even greater detail as to the situations which commonly lead to falls, including:

- Working on a scaffold or working platform without guardrails;
- Working above the guardrail without additional protection;
- Working in and around lift wells and stairway openings without guardrails;
- Working from ladders which are of poor quality, badly maintained, or incorrectly positioned and not secured at both the top and bottom;
- Working on roofs constructed of brittle material;
- Riding on crane-suspended loads;
- Cleaning windows from narrow ledges without a safety harness and line;
- Working in an area where holes in the floor are not covered or protected by guardrails;
- Working from suspended scaffolds or elevated work platforms without safety belts or harnesses; and
- Working on roofs without protection in place to prevent a fall

(Occupational Safety & Health Service, Department of Labour, Wellington, 1998).

While it is common to have protective measures such as guardrails and hole covers in place at the beginning of a project, these preventive measures are often not continued through the stages of construction or are removed during the undertaking of a specific task and are not repositioned or reconstructed. When this occurs, the only means of protection that workers are left with is their own level of common sense and the hope that their train of thought does not stray from their work.

Fall Protection Regulations

The first fall protection regulations were written by the Occupational Safety and Health Administration (OSHA) and have been in effect since its inception in the 1970's, with the most recent updates effective February 6, 1995 (National Association of Home Builders, 1998). These regulations were intended to prevent employees from falling off, onto or through working levels and to protect employees from falling objects (Occupational Safety and Health Administration, U.S. Department of Labor, 1994). Furthermore, in a speech given to the U.S. House of Representatives Subcommittee on Regulation and Paperwork and the Committee on Small Business, on June 15, 1995, by then Assistant Secretary of Labor for Occupational Safety and Health, Joseph Dear, he stated, "The standard was developed with the participation and involvement of interested parties from both labor and industry, and is expected to save over \$200 million annually in wage and productivity losses, medical costs, administrative expenses, and other costs associated with accidents" (Occupational Safety and Health Administration, U.S. Department of Labor, 1995).

The specific standard relating to fall protection within the construction industry is Subpart M, Fall Protection, Title 29 of the Code of Federal Regulations (CFR), 1926:500

through 1926:503, located within *The Safety and Health Regulations for Construction*. Section 1926.500 focuses on the scope, application, and definitions applicable to Subpart M, with section 1926:501 explaining the responsibility to provide fall protection. Section 1926:502 discusses fall protection systems criteria and practices, while section 1926:503 sets forth the training requirements under Subpart M. Subpart M covers a vast array of falls including falls from: walking/working surfaces, unprotected sides and edges, leading edges, hoist areas, holes, formwork, excavations, ramps, runways, and other walkways, dangerous equipment, overhand bricklaying and related work, low-sloped roofs, steep roofs, residential construction, wall openings, and from walking or working surfaces not otherwise addressed (National Association of Home Builders, 1998).

While Subpart M is the designated subpart for fall protection, relevant fall protection information is also covered in several other subparts, particularly: Subpart C – General Safety and Health Provisions; Subpart E – Personal Protective and Life Saving Equipment; Subpart L – Scaffolds; Subpart N – Cranes, Derricks, Hoists, Elevators, and Conveyors; Subpart P – Excavations; Subpart R – Steel Erection; Subpart V – Power Transmission and Distribution; and Subpart X – Ladders. Fall protection information may also be found in the General Industry Standards in Subpart D – Walking-Working Surfaces, 29 CFR 1910:21 through 1910:30, which covers floor and wall openings and holes, stairs, ladders, and scaffolds.

As part of *The Safety and Health Regulations for Construction* set forth by OSHA, 29 CFR Part 1926:501; Duty to have Fall Protection, requires that fall protection must be provided any time an employee is working six or more feet above a lower level or dangerous equipment. Furthermore, employers are responsible for assessing the

workplace and determining if the walking and working surfaces from which its employees are to perform their work have the strength and structural integrity to safely support their employees. Consequently, employees are only allowed to work from these surfaces upon the authorization from the employer (Occupational Safety and Health Administration, U.S. Department of Labor, 1995).

Since the fall protection regulations were written with commercial and industrial construction in mind, some construction industry professionals believe that the current regulations do not adequately address the differences between the residential, commercial, and industrial sectors of the industry. As a result, the residential construction industry objected to the most recent fall protection regulation because some of the fall protection methods specified are physically impractical or actually increase the risk of falls in residential construction (National Association of Home Builders, 1998). In response, OSHA published an Interim Fall Protection Compliance Policy, known as a compliance directive, for fall protection of certain residential construction activities which went into effect December 8, 1995 (Occupational Safety and Health Administration, U.S. Department of Labor, 1999).

The compliance directive allows for the residential construction sector to more easily and cost effectively comply with the fall protection standards by allowing alternative fall protection plans for four groups of residential construction activities. The four groups include:

1. GROUP 1. Installation of floor joists, floor sheathing, and roof sheathing; erecting exterior walls; setting and bracing roof trusses and rafters;

2. GROUP 2. Working on concrete and block foundation walls and related formwork;
3. GROUP 3. This group consists of the following activities when performed in attics and on roofs: installing drywall, insulation, HVAC systems, electrical systems (including alarms, telephone lines, and cable TV), plumbing, and carpentry.
4. GROUP 4. Roofing work (removal, repair, or installation of weatherproofing roofing materials such as shingles, tile, and tar paper)

(Occupational Safety and Health Administration, U.S. Department of Labor, 1999).

While this compliance directive addressed some of the differences in methods used in residential, commercial, and industrial settings, there are still issues which remain unresolved. Overall, 29 CFR Part 1926, Subpart M: Fall Protection, serves as the ultimate law of the land for fall protection within the construction industry.

In addition to Subpart M, The American National Standards Institute (ANSI) has published several standards relating to fall protection. Two key standards pertaining to fall protection are ANSI A10.14 and ANSI Z359.1. ANSI A10.14, titled American National Standard for Construction and Demolition Operations – Requirements for Safety Belts, Harnesses, Lanyards, and Lifelines for Construction and Demolition Use, was approved on July 31, 1991 and published by the National Safety Council in 1992. This standard is based on A10.14-1975, which had been withdrawn due to developments in the science and art of elevated personal fall protection which have resulted in a better understanding of the use of fall protection systems, including the use of belts, harnesses,

and lanyards (American National Standards Institute, 1992). This standard is arranged as follows:

1. Scope and Purpose;
2. Compliance and Variations;
3. Definitions;
4. Performance Requirements;
5. Classification for Use;
6. User's Responsibilities, Selection, and Use;
7. Marking and Instruction;
8. Test Methods; and
9. Standards Referenced

(American National Standards Institute, 1992).

Meanwhile, ANSI Z359.1, titled American National Standard Safety Requirements for Personal Fall Arrest Systems, Subsystems, and Components, was approved on June 4, 1992 and published by the American Society of Safety Engineers (ASSE) in 1992. This standard addresses personal equipment and related methods for arresting falls of an individual from heights (American National Standards Institute, 1992). ANSI Z359.1 is divided into the following sections:

1. Scope, Purpose, Application, Exceptions, and Interpretations;
2. Definitions;
3. Requirements;
4. Qualification Testing;
5. Marking and Instructions;

6. User Inspection, Maintenance, and Storage of Equipment;
7. Equipment, Selection, Rigging, Use, and Training; and
8. References

(American National Standards Institute, 1992).

Additional ANSI standards relating to fall protection include ANSI A10.4 – Safety Requirements for Personnel Hoists and Employee Elevators for Construction and Demolition Operations, ANSI A10.8 – American National Standard for Construction and Demolition Operations-Scaffolding Safety Requirements, ANSI A10.11 – American National Standard for Construction and Demolition Operations-Personnel and Debris Nets, and ANSI A10.18 – American National Standard for Construction and Demolition Operations-Safety Requirements for Temporary Floor Holes, Wall Openings, Stairways, and Other Unprotected Edges. ANSI A10.24 – Roofing, ANSI A10.32 – Fall Prevention Systems, and ANSI A10.37 – Debris Nets are all standards which are under development.

Types of Fall Protection

As part of *The Safety and Health Regulations for Construction*, OSHA lists several types of fall protection systems within 29 CFR 1926:502 – Fall Protection Systems Criteria and Practices, including:

- Guardrail systems;
- Safety net systems;
- Personal fall arrest systems;
- Positioning device systems;
- Warning line systems;
- Controlled access zones;

- Safety monitoring systems; and
- Covers

(Occupational Safety and Health Administration, U.S. Department of Labor, 1995).

A guardrail system consists of a barrier erected to prevent workers from falling to a lower level (Construction Safety Council, 1995). Guardrail systems must be designed and built to meet the requirements of 1926.502(b)(1) to 1926.502(b)(15) (Occupational Safety and Health Administration, U.S. Department of Labor, 1995).

Safety net systems are another conventional fall protection system that contractors may use to protect employees from fall injuries (Construction Safety Council, 1995). Safety net systems are made of synthetic materials that have openings which do not exceed 36 square inches (230 cm) nor be longer than 6 inches (15 cm) on any side (Occupational Safety and Health Administration, U.S. Department of Labor, 1995) and are positioned under walking/working surfaces to catch employees, tools, or materials that may fall.

Personal fall arrest systems consist of an anchorage, connectors, body harness, and may include a lanyard, deceleration device, lifeline, or suitable combinations used to arrest an employee in a fall from a working level (Occupational Safety and Health Administration, U.S. Department of Labor, 1995).

Positioning device systems use a body harness rigged to allow an employee to be supported on an elevated vertical surface, such as a wall, and work with both hands free while leaning (Occupational Safety and Health Administration, U.S. Department of Labor, 1995). A positioning device system uses some of the same components as a

personal fall arrest system; however, a positioning device is used to hold a person in position so they do not fall while working, while a personal fall arrest system is designed to stop a person from falling.

A warning line system is a barrier erected on a roof to warn employees that they are approaching an unprotected roof side or edge (Occupational Safety and Health Administration, U.S. Department of Labor, 1995). Warning line systems are used in situations where the use of other fall protection systems such as guardrails, safety nets, or personal fall arrest systems would create a greater hazard.

Controlled access zones are areas in which certain work may take place without the use of guardrail systems, personal fall arrest systems, or safety net systems and access to the zone is controlled (Occupational Safety and Health Administration, U.S. Department of Labor, 1995). A controlled access zone restricts entry to an area by allowing only employees working directly in an area to enter it.

A safety monitoring system is a safety system in which a competent person is responsible for recognizing and warning employees of fall hazards (Occupational Safety and Health Administration, U.S. Department of Labor, 1995). The person responsible for monitoring the other employees has no other job duty than to direct their full attention to protecting their fellow employees.

Covers are used to protect employees from falling through or into holes and other openings in floors, roofs, and/or other walking/working surfaces. The definition of a hole is a gap or void 2 inches or more in its least dimension in a floor, roof, or other walking/working surface (Construction Safety Council, 1995).

Employee Training

Employees potentially exposed to fall hazards in the workplace must receive fall protection training. Title 29 of the Code of Federal Regulations, Part 1926, Subpart M: Fall Protection, 1926.503(a)(1) specifically states,

“An employer shall provide a training program for each employee who might be exposed to fall hazards with the program enabling each employee to recognize the hazards of falling and shall train each employee in the procedures to be followed in order to minimize these hazards”

(Occupational Safety and Health Administration, U.S. Department of Labor, 1995).

Training in the following areas shall be received, as required by OSHA:

- The nature of fall hazards in the work area;
- The correct procedures for erecting, maintaining, disassembling, and inspecting the fall protection systems to be used;
- The use and operation of guardrail systems, personal fall arrest systems, safety net systems, warning line systems, safety monitoring systems, controlled access zones, and other protection to be used;
- The role of each employee in the safety monitoring system when this system is used;
- The limitations on the use of mechanical equipment during the performance of roofing work on low-sloped roofs;
- The correct procedures for the handling and storage of equipment and materials and the erection of overhead protection; and

- The role of employees in fall protection plans

(Occupational Safety and Health Administration, U.S. Department of Labor, 1995).

The fall protection training which employees receive should include both classroom instruction and hands-on demonstration to ensure that all employees involved understand and are able to put to practice the training provided to them. Comprehension of the material presented is imperative, since employees may often be working without direct supervision and correct use of the fall protection system(s) is crucial to the employee's well-being and that of their co-workers.

In addition to the training provided, a record of all fall protection training completed by the employee should be documented in written form to include: type of training completed, date of training, location of training, company providing the training, and a minimum of three signatures. The signatures included should be that of: instructor performing the training, employee receiving the training, and the direct supervisor(s) of the employee(s) receiving the training. The direct supervisor(s) of the employee(s) receiving the training should also partake in the training at the same time, or if they have previously received the training, shall be capable of confirming their competence of the material presented by passing a test given to all employees at the conclusion of the training session. The direct supervisor's completion of training instruction received by subordinate employee(s) is crucial in the event that an employee requires clarification at a future date regarding previously presented material. Besides training, employees shall be retrained when the employer has reason to believe that any employee lacks complete comprehension or the skills required to maintain fall protection practices, as set forth by

Title 29 of the Code of Federal Regulations, Part 1926, Subpart M: Fall Protection, 1926.503(c) (Occupational Safety and Health Administration, U.S. Department of Labor, 1995).

Employee Disciplinary Procedures

Disciplinary procedures for employees vary slightly from company to company within the construction industry according to the severity of the violation. However, each employee has the responsibility to assist in preventing exposure to workplace health and safety hazards by complying with all OSHA requirements that apply to their actions and conduct. In order to assure compliance with safety requirements, the following disciplinary procedures are widely accepted throughout the construction industry (as well as general industry) regarding violations of company policy:

1. 1st offense – verbal warning;
2. 2nd offense – verbal and written warning;
3. 3rd offense – verbal and written warning, suspension from work; and
4. 4th offense – termination

(Coomer, 2001).

The first offense involves a verbal warning given to an employee by a supervisor discussing with the employee the substandard act which was being performed or substandard condition which the employee unnecessarily exposed themselves to. The warning should be communicated to the employee as soon as they are observed performing a substandard practice or unnecessarily being exposed to a substandard condition so that they may be informed of the situation, take immediate corrective action, and understand how to prevent the situation in the future.

The second offense is similar to the first; however, in addition to the verbal warning given by the employee's supervisor, the supervisor also issues a written warning. The written warning consists of documentation by the supervisor of the substandard practice or substandard condition observed, the employee involved, the date and time of the observation, the jobsite the employee was on, and the general conversation between the supervisor and employee during the verbal discussion. The written warning is then kept in the project file, with a copy sent to the company's main headquarters and stored in the employee's file.

The third offense is similar to the second offense, with the employee also receiving a suspension from work. The length of the suspension is determined by the company based upon assessment of the severity of the violation, and the suspension may be with or without pay at the discretion of the company. A fourth offense results in the employee being immediately terminated and ineligible for rehire with the company. Immediate termination may also result if an employee voluntarily commits a violation of company policy or the Safety and Health Regulations for Construction (whichever is stricter) with intentional disregard for their well-being, that of their co-workers, or the company as a whole.

Fall Prevention Strategy

OSHA's fall protection standard, similar to the majority of the regulations the agency has written, is performance oriented (Rekus, 1999). While the standard sets forth operational expectations which must be adhered to, it does not identify specific procedures for achieving conformance.

In an effort to prevent falls on construction sites, the Construction Safety Council published a *Fall Protection Reference Manual* in which pre-planning is explored as a technique for fall prevention. The manual looks at four individual areas of pre-planning including:

1. Pre-planning from the design stage;
2. Engineering out the fall hazards;
3. Contractor selection; and
4. Pre-bid job meetings

(Construction Safety Council, 1995).

In pre-planning from the design phase, owners and contractors are encouraged to spend time with designers and architects deciding what methods of fall protection may be used to effectively eliminate or control the fall hazards (Construction Safety Council, 1995). To eliminate a fall hazard the designer or architect may specify the assembly of a system to be performed on the ground and then lifted into place or be delivered to the jobsite already installed. When openings for ductwork, plumbing, stairways and other systems must be created, these voids should be constructed only when the schedule dictates the need and for as short a length of time as possible. However, in areas and situations where fall prevention methods can not address the fall hazards adequately, the most appropriate protective measures should be specified.

If there are still fall hazards to be addressed upon completion of the design phase, the focus should turn to engineering out the fall hazards. Guardrails, safety nets, and lifeline systems can be installed on building components before the fall hazard exists (Construction Safety Council, 1995). Likewise, floor and roof openings can be cut only

when needed, avoiding the need for covers and work can be performed from scissor lifts, minimizing the need for personal fall arrest systems.

When selecting a contractor the owner should consider a contractor which has a written safety program which addresses fall protection and explains their methods of providing fall protection (Construction Safety Council, 1995). An additional consideration is whether the program is followed or merely written to meet the OSHA standards. Moreover, has the contractor experienced any severe falls in the past few years and does the contractor address the issue of fall protection seriously, are questions which should be examined.

Finally, pre-bid meetings should include all bidding contractors and address fall protection required on the project. If the requirements are conveyed to contractors up front, the potential for compliance and regulatory concerns can be minimized (Construction Safety Council, 1995). The Construction Safety Council's *Fall Protection Reference Manual* also suggests that no contractor be allowed to bid a job without written proof of a fall protection program, with all contractors and subcontractors being informed of the minimum fall protection requirements of the project.

Similar to the *Fall Protection Reference Manual* written by the Construction Safety Council, the National Association of Home Builders (NAHB), in conjunction with the U.S. Occupational Safety and Health Administration (OSHA), has written the *NAHB-OSHA Jobsite Safety Handbook*. The handbook is designed to identify safe work practices and related OSHA requirements that have an impact on the most hazardous activities in the construction industry (National Association of Home Builders, 1999). While the handbook is not intended to replace any requirements in the OSHA regulations

for construction, the goal of the handbook is to help the residential construction industry comply with OSHA standards. The handbook outlines four main elements to an effective company safety program as follows:

1. Management commitment – including a clear statement of policy by the owner, management support of safety policies and procedures, and employee involvement in the structure and operation of the program;
2. Worksite analysis – setting forth procedures to analyze the jobsite and identify existing hazards and conditions and operations in which changes might occur to create new hazards;
3. Hazard prevention and control – which establishes procedures to correct or control present or potential hazards on the jobsite; and
4. Safety and health training – in which the complexity of training depends on the size and complexity of the worksite, the potential hazards at the site, and the characteristics of the hazards

(National Association of Home Builders, 1999).

In addition to the *Fall Protection Reference Manual* published by the Construction Safety Council and the *NAHB-OSHA Jobsite Safety Handbook*, Comprehensive Loss Management, Inc., a construction consulting firm, has published a five step approach for a fall prevention strategy in *Blueprints for Safety: Construction Fall Protection*. According to *Blueprints for Safety: Construction Fall Protection*, the first step in developing a Fall Prevention Strategy is to determine if a fall hazard exists. There are several ways in which a person can identify if a fall hazard exists, including:

- inspecting the jobsite visually;
- discussing jobsite safety with employees; and
- reviewing accident/incident records

(Comprehensive Loss Management, Inc., 1995).

Each jobsite should be inspected by a competent person at the beginning of each shift and anytime jobsite conditions change considerably. An inspection may consume from five to thirty minutes or more depending on the size of the jobsite, number of employees on the jobsite, jobsite conditions, and the number and complexity of fall hazards encompassed within the jobsite.

Discussing jobsite safety with employees on a regular basis is another technique by which jobsite fall hazards may be identified. Fall protection should be discussed with workers on a daily basis so employees remain aware of the dangers that surround them. Finally, reviewing accident/incident records is an accurate method for determining what types of fall hazards exist on a jobsite. While this approach is a quick indicator for fall hazards, this method is reactive in that one would only know that a hazard exists if someone were injured. Thus, the first two approaches for identifying fall hazards on a jobsite are much preferred.

Once the company has determined whether a fall hazard exists, the second step in developing a Fall Prevention Strategy is to select the proper fall protection system(s) which will best address the fall protection needs posed on the jobsite. When selecting a fall protection system or systems, the following items should be considered:

- the height at which employees will be performing their tasks;
- the amount of movement employees will need in performing their tasks;

- the conditions in which employees will be performing their tasks; and
- the amount of training needed to sufficiently instruct employees on the proper installation, maintenance, use, and disassembly of the system

(Comprehensive Loss Management, Inc., 1995).

Upon choosing the fall protection system(s) to adequately address the company's and employees fall protection needs, the next step in developing a Fall Prevention Strategy is to provide all employees who will be exposed to fall hazards on the jobsite with the necessary training to perform their tasks safely. Training should consist of classroom instruction, as well as hands-on demonstration or role playing to ascertain that all employees understand the information being conveyed and will be able to utilize the information at the jobsite. Additionally, a written record of the fall protection training received by employees should be documented including:

- type of training provided;
- date of training provided;
- name(s) and signature(s) of employee(s) who received training;
- name(s) and signature(s) of instructor(s) providing the training;
- name of company providing the training; and
- location of the training.

In addition to training, the Fall Prevention Strategy must be supported throughout the organization. The three key areas crucial in supporting the strategy are: management commitment, employee buy-in, and ongoing support (Comprehensive Loss Management, Inc., 1995). Management should take responsibility for communicating their support of fall protection throughout the organization, as well as demonstrating the importance of

employee involvement in discussions, meetings, and training. Managers and supervisors should also use fall protection equipment properly and follow safe work procedures designated by the company to set an example for employees.

Employee buy-in is a second essential topic to supporting a Fall Prevention Strategy. Employees must understand and accept the need for fall protection and be motivated to use it correctly. All employees should be well informed concerning fall protection including:

- what job activities require fall protection;
- what tasks/activities require fall protection; and
- what locations/areas of the jobsite require fall protection

(Comprehensive Loss Management, Inc., 1995).

Additionally, only those areas of the jobsite which contain identified fall hazards require fall protection, since if there is no perceived danger, employees are less likely to properly use the fall protection system(s) implemented by the company.

The final element in supporting fall protection is ongoing support. Support of fall protection should be a continual effort on the part of all employees. Some examples of ongoing fall protection support include incorporating fall protection into the new employee orientation, hanging posters that reinforce the importance of fall protection, conducting safety meetings pertaining to fall protection, and distributing information on the use of fall protection at home (Comprehensive Loss Management, Inc., 1995). With the commitment of management, employee buy-in, and ongoing support the probability of an effective fall prevention strategy is increased.

Finally, by monitoring fall protection at the jobsite the effectiveness of fall prevention may be ensured. Fall protection should be monitored through:

- inspecting jobsites to ensure that fall protection is adequate and being properly used;
- requiring the evaluation of fall protection program effectiveness a part of every supervisor's daily routine; and
- purchasing high-quality, durable fall protection equipment that is easy to use and readily available

(Comprehensive Loss Management, Inc., 1995).

If any problem arises concerning fall protection, immediately determine the cause(s) for the problem and implement corrective action. Moreover, the fall protection program should be revised periodically to remain current with advancing technology and changing work environments.

The Occupational Safety and Health Administration and the American National Standards Institute have recognized the importance of preventing injuries and fatalities due to falls and have therefore published standards, regulations, and guidelines pertaining to fall protection in construction. Companies should follow the initiative of these organizations in addressing falls in construction by anticipating the possibility that a fall may occur at the jobsite, identifying and analyzing fall hazards and situations that may lead to falls, implementing fall protection equipment and training employees in its use, developing and conveying disciplinary procedures, and providing continual monitoring and feedback of the fall prevention strategy. With conscientious employees at all levels and strict adherence to the published standards, regulations, and guidelines set forth by

OSHA and ANSI, falls in the construction industry may be reduced and the traumatic effects lessened.

This chapter discussed loss trends for falls in the construction industry, causes and situations which lead to falls, and fall protection regulations in place to control fall hazards at the jobsite. Furthermore, the types of fall protection available, recommended employee fall protection training, and disciplinary procedures for failure to obey industry recognized safe work practices and procedures for fall protection was conveyed. The chapter concluded with strategies for preventing falls at the jobsite.

CHAPTER THREE

Methodology

Introduction

This chapter will discuss the methods used in undertaking this research. The following text provides an understanding of the methods by which the sample was chosen. In addition, information regarding the development of the research instrument is identified, as well as an explanation as to the means by which data will be collected and analyzed. This chapter will conclude with a statement of the limitations of the research instrument.

Selection and Description of Sample

The sample for this research will be the production employees at XYZ Construction, Menomonie, Wisconsin. All current employees are male, with residential construction experience ranging from less than one year to more than fifteen years. The production employees at XYZ Construction were chosen as the sample since the research is attempting to identify to what extent production employees at XYZ Construction understand and comply with industry recognized safe work practices and procedures regarding fall protection.

Instrument

The instrument which will be used to survey the production employees at XYZ Construction will be a questionnaire developed by the researcher. The instrument will be specifically created for this research; therefore no measures of validity or reliability are currently associated with the instrument. The questionnaire will consist of questions regarding proper fall protection practices and procedures applicable to the operations of a

home builder within the residential building sector. Furthermore, the questions will be generated from the text of the *Code of Federal Regulations, Part 1926: The Safety and Health Regulations for Construction*. The answers to the questions will be fill-in-the-blank, expressed in multiple choice format.

Data Collection

The data will be collected on November 17, 2003, at the jobsite of XYZ Construction. The researcher will arrive at the jobsite of XYZ Construction at approximately 10:00 A.M, at which time the researcher will spend approximately 30 to 60 minutes observing the production employees working. After observing the production employees, the questionnaire and pens will be provided to all production employees of XYZ Construction. The general objective of the research will be stated and the employees will have an opportunity to ask any questions. Employees will not be given a time limit in which to complete the questionnaire. The estimated completion time is approximately ten minutes, with questionnaires being collected by the researcher upon completion. In addition to the questionnaire completed by the production employees, the owner of XYZ Construction will be given a separate questionnaire consisting of short answer responses to questions pertaining to fall protection pre-planning.

Data Analysis

Once all of the questionnaires have been collected, the researcher will analyze the questionnaires. The multiple choice questions will be analyzed by recording (1) the number of employees choosing each of the possible answers, (2) the number of employees choosing the correct answer, and (3) the percent of employee's choosing the correct answer. The short answer questions posed to the owner will be analyzed by

comparing the text of the *Code of Federal Regulations, Part 1926: The Safety and Health Regulations for Construction* to the content of the answers.

Limitations

One limitation is the possibility that the morning the questionnaire is to be given to the production employees of XYZ Construction, an employee may be absent. In an attempt to foresee this potential setback, the researcher will call the company owner the morning the research is to be conducted to determine if all production employees are present that day. If all production employees are not present, the researcher will decide whether to proceed with the gathering of research as planned or reschedule.

Another limitation resulting from the use of a questionnaire is the possibility for the data gathered to be misrepresentative of the knowledge level of production employees regarding fall protection practices and procedures. With the use of multiple choice questions, the opportunity exists for members of the sample to randomly choose the correct response, even if they do not know the correct answer.

CHAPTER FOUR

Results

Introduction

This chapter will present the results of the study. First the observations from visually studying the production employees work practices and procedures will be presented along with a discussion of the level of compliance to industry recognized safe work practices and procedures. Next, the questions given to and completed by the production employees will be stated, along with the employee responses. Finally, the chapter will close with the questions posed to the supervisor and the responses given.

Observations

The production employees of XYZ Construction were observed for approximately 40 minutes building, setting in place, and bracing interior and exterior walls for a light commercial structure. The walls were being built on a slab on grade foundation and consisted of 2 x 6 lumber cut to the designated length with a circular saw which was then fastened together by means of nails and cordless framing nail guns. Once fastened together the walls were raised and positioned with a telescoping boom forklift. The walls were then secured into the concrete slab by fasteners from a powder-actuated tool and to the other walls by nails from a framing nail gun.

The walls were 16 feet in height, so in order to fasten the tops of the walls together an employee climbed a ladder to attain the height needed to secure the walls together with nails. The walls were braced into position using 20 foot long 2 x 4 lumber and secured by means of nails from the framing nail guns. Employees attained the height and position needed to brace the walls by using ladders and aluminum planks set between

aluminum saw horse type devices which were adjustable so workers may attain additional height. Consequently, a scaffold was created when the planks were positioned to rest on the saw horse devices.

When employees were positioning, securing, and bracing the walls they were on numerous instances working at or above six feet, therefore the operations of XYZ Construction were covered by the *Code of Federal Regulations, Part 1926: The Safety and Health Regulations for Construction*. While there were no hole covers or guardrails in use during the observation period, there also lacked any restraint system used to restrict employees from falling backwards to the concrete slab below while on the scaffold system. Self-supporting ladders which can be climbed from either side were being used by employees, so the angle of the ladder was not applicable to the operations; however, with the legs of the saw horse devices extended to attain additional height for the scaffolding, the access height to the first step on the saw horse device was more than the maximum 19 inches designated within the *Code of Federal Regulations, Part 1926: The Safety and Health Regulations for Construction*. Furthermore, the planking of the scaffold was within the designated 14 inches from the wall and the telescoping boom forklift was at no time within 10 feet of any electrical lines. While the production employees at XYZ Construction were in compliance with some of the safe work practices and procedures for fall protection within the *Code of Federal Regulations, Part 1926: The Safety and Health Regulations for Construction*, they were not in compliance with all of the regulations.

Questionnaire to Production Employees

A questionnaire which consisted of questions regarding industry recognized proper fall protection practices and procedures applicable to the operations of a residential construction company was specifically created for this research. The questions were generated from the text of the *Code of Federal Regulations, Part 1926: The Safety and Health Regulations for Construction*. The questionnaire was given to each of the production employees at XYZ Construction and their respective responses follow.

Question 1: The fall protection standard for construction covers anyone who works ___ feet above the ground or above dangerous equipment. One employee answered correctly with six feet. Of the remaining three employees, two replied four feet and one employee responded eight feet.

Question 2: The height of the top rail of a guardrail system must be ___ inches, plus or minus 3 inches from the walking/working level. One employee responded with the correct answer of 42 inches, while the remaining three employees answered 36 inches.

Question 3: Toeboards must be at least ___ inches high. One employee replied correctly with the response of 3 ½ inches. Two employees responded 5 ½ inches and one employee answered 2 ½ inches.

Question 4: Covers must be color coded or marked with the word “_____” or “Cover” to provide warning of the hazard. All employees responded with the incorrect answer of “Caution.” The correct answer was “Hole.”

Question 5: Covers must be capable of supporting at least ___ times the weight of workers, equipment, and materials that could be placed on the cover at any given time.

Two employees replied correctly by choosing 2. Of the remaining employees, one responded 2.5 and one answered 3.

Question 6: All covers must be secured when installed so as to prevent accidental removal by _____. Of four employees, three answered correctly by choosing wind, equipment, and employees. The remaining employee responded with just employees.

Question 7: During the performance of roofing work, materials and equipment should not be stored within ____ feet of a roof edge unless guardrails are in place at the edge. No employees replied with the correct answer of six. Three employees responded two feet, while the remaining employee answered eight feet.

Question 8: A stairway or ladder should be provided at all points of access where there is a break in elevation of ____ inches or more. None of the employees answered with the correct response of 19 inches. Two employees answered 12 inches and two chose 24 inches.

Question 9: Ladders should extend at least ____ feet above the access level or landing platform. Two employees replied with the correct response of three feet, while the remaining two employees chose two feet and four feet.

Question 10: Angle a ladder so that the distance from the bottom of the ladder to the structure equals ____ the ladder's working length. Of the four employees, two responded correctly by choosing $\frac{1}{4}$ the ladder's working length. The other two employees chose $\frac{1}{3}$.

Question 11: When using planking for scaffolding purposes, the front edge of the planking should not be more than ____ inches from the structure. The correct response of

14 inches was given by two employees. The other responses were 10 inches and 12 inches.

Question 12: Each end of a plank, unless cleated or otherwise restrained, should extend over the center of the support at least ____ inches. Two employees chose the correct response of 6 inches, while the remaining two employees answered 12 inches.

Question 13: Each plank 10 feet or less in length should not extend over its support more than ____ inches. Three employees responded correctly by choosing 12 inches, with the remaining employee answering 6 inches.

Question 14: Each plank greater than 10 feet in length should not extend over its support more than ____ inches. Of the four employees, the correct response of 18 inches was chosen by one employee. Two employees answered 12 inches and one replied 9 inches.

Question 15: On scaffolds where planks are overlapped to create a long platform, the overlap should occur only over supports, and the overlap should not be less than ____ inches unless the planks are nailed together or otherwise restrained from moving. Three of four employees answered correctly by responding 12 inches. The remaining employee chose 18 inches.

Question 16: Scaffolds and their components should be inspected for visible defects by a competent person _____ each work shift and after any occurrence which could affect the scaffold's structural integrity. Two employees chose the correct response of before each work shift, while the remaining two employees answered throughout each work shift.

Question 17: Employees shall not work on scaffolds covered with _____, except as necessary for removal of such material(s). All four employees answered with the correct response of snow, ice, or slippery material.

Question 18: Poles for “pump jack scaffolds” should be secured to the structure by triangular bracing or equivalent at the _____ and other points as necessary. No employee replied with the correct response of top and bottom. Three employees answered top and one employee chose bottom.

Question 19: Planking used with “ladder jack scaffolds” should not exceed a height of ____ feet. One employee correctly replied with the response of 20 feet. Of the remaining three employees, one answered 18 feet, one replied 22 feet, and one responded 25 feet.

Question 20: Maintain a minimum distance of at least ____ feet between any part of an aerial lift and an electrical line. Two employees responded correctly by answering 10 feet, with the other two employees replying 20 feet.

Questionnaire to Supervisor

A form was given to the supervisor to complete regarding fall protection pre-planning activities and fall protection training. The first question asked if pre-planning activities regarding fall protection were conducted. The supervisor responded that pre-planning activities pertaining to fall protection are conducted on a daily basis depending on the situation and equipment used on that particular day. The second question posed was if fall protection training was provided to employees. The supervisor answered that fall protection training is provided to employees. On the day of the situation involving working at heights or other fall protection considerations, the employees are told or

shown by the supervisor what to do and what not to do regarding proper fall protection practices and procedures.

CHAPTER FIVE

Summary, Conclusions, and Recommendations

Introduction

This chapter will consist of a brief summary of the study along with a listing of the major findings. Next, the conclusions from the study will be presented. The chapter will conclude with recommendations for XYZ Construction pertaining to fall protection.

Summary

The purpose of this research was to identify to what extent production employees at XYZ Construction are knowledgeable of and adhere to proper fall protection practices and procedures, and to determine to what extent preplanning pertaining to fall protection occurs. This was accomplished by first identifying employee compliance to fall protection regulations associated with the company's operations, followed by the determination of employee understanding of fall protection regulations related to residential construction and the amount of fall protection preplanning conducted on behalf of the supervisor.

The goals of the research were to:

1. Observe the fall protection practices being performed by production employees to determine the level of compliance to industry recognized safe work practices and procedures.
2. Determine the extent of familiarity by production employees with industry recognized proper fall protection practices and procedures.
3. Identify to what degree management performs pre-planning activities with regard to fall protection.

The research began by identifying the extent to which the production employees of XYZ Construction comply with industry recognized safe work practices and procedures. The employees were observed performing routine tasks that involved fall hazards which are covered by specific regulations within the text of the *Code of Federal Regulations, Part 1926: The Safety and Health Regulations for Construction*. The employees were also given a questionnaire comprised of multiple choice questions regarding proper fall protection practices and procedures applicable to the operations of a residential construction company, with the questions generated from the text of the *Code of Federal Regulations, Part 1926: The Safety and Health Regulations for Construction*. The research concluded with the supervisor completing a questionnaire which consisted of questions pertaining to fall protection pre-planning activities performed by the supervisor.

The following are a listing of the major findings resulting from the fall protection research conducted at XYZ Construction: and a short discussion: something like this:

1. The production employees were performing construction operations and completing tasks within compliance of the recognized safe work practices and procedures designated within *The Safety and Health Regulations for Construction* more than 50 percent of the time being observed .
2. Only one out of four employees responded correctly that the height above the ground at which the operations of XYZ Construction were covered by the *Code of Federal Regulations, Part 1926: The Safety and Health Regulations for Construction* was six feet.

3. Three out of four employees did not correctly respond to Question 2 and 3 which pertained to a typical guardrail system used in construction.
4. None of the employees chose the correct word which should be written on a cover being used prevent personnel, equipment, or tools from falling into a hole in the floor of a building or other part of the structure.
5. Of the four employees, no one answered correctly the only question relating to roofing when the roof is a major component of all buildings and employees spend a significant amount of time constructing the roof.
6. None of the four employees correctly answered the change in elevation distance at which at stairway or ladder should be provided.
7. Pre-planning activities which relate to fall hazards and fall protection are said to be performed by the supervisor; however, pre-planning is not documented.
8. There is no formal, documented training related to fall protection practices and procedures conducted by the supervisor or the company.

Conclusions

The research verified that fall hazards are apparent in the daily tasks performed by production employees and the current operations of XYZ Construction. While some fall protection training is conducted by the supervisor, the results of the questionnaire completed by the production employees suggests that the employees are either not being instructed in the proper requirements designated by the regulations or not retaining the subject matter which they are receiving instruction in. Of the 20 questions posed to the production employees, only one question was answered correctly by all employees, while

four questions were answered incorrectly by all employees. Considering that all the questions are applicable to the operations of a residential construction company and were generated from the text of the *Code of Federal Regulations, Part 1926: The Safety and Health Regulations for Construction*, this leads the researcher to conclude that the employees may not be receiving instruction from the supervisor regarding the requirements designated in the *Code of Federal Regulations, Part 1926: The Safety and Health Regulations for Construction*, but rather the supervisor's own opinions as to guidelines for fall prevention. The low number of employees correctly answering each question reinforces the probability that employees are receiving information contradictory to that contained within the regulations. Overall, the employees tended to function in compliance to designated safety and health regulations; however the level of compliance by production employees does not appear to accurately reflect their degree of understanding of the fall protection regulations contained within the *Code of Federal Regulations, Part 1926: The Safety and Health Regulations for Construction*.

Recommendations

Based on the findings from the research conducted, the following are recommendations for XYZ Construction:

1. Provide fall protection training based on Subpart M and ANSI standards to all employees. While production employees are informed as to what to do and what not to do by the supervisor on the day of a situation involving an exposure to a fall hazard, it would be in the best interest of the company to provide more formal fall protection training. Furthermore, refresher training should be provided as deemed necessary by the employer and supervisor.

2. Evaluate employee retention of training instruction with employees completing a written exam upon conclusion of a training session.
3. Document all Fall Protection Training provided by the company to ensure a written record of the training, with the company retaining a record of the training for its files.
4. Adopt written company policies and procedures pertaining to fall protection practices and procedures. By instituting company policies and procedures for fall protection, XYZ Construction would be establishing recognized regulations and guidelines to be followed by all employees. These policies and procedures would clear up any disagreement as to what the proper safe work practice and/or procedure of the company is. Furthermore, the company's policies and procedures for fall protection may be devised from the OSHA and ANSI regulations and guidelines, in so long as the adopted policies and procedures are as strict as those established and/or recommended by OSHA and ANSI.
5. Ensure that all new employees receive a new employee orientation. At a minimum the new employee orientation should include an overview of the company's operations, instructions on all personal protective equipment utilized by the company and its correct use, the safe work practices and procedures to be followed by all employees, and any additional instruction or training deemed necessary by the company.
6. Purchase Personal Fall Arrest and Fall Restraint equipment which could be utilized during the operations of XYZ Construction to control fall hazards and reduce the risk of employee injury as a result of a fall.

7. Construct a one page Work Activities Form to be completed by the supervisor each day. Sample items to be completed on the form should include: name of supervisor filling out form; date; work activities to be performed that day; possible contingency work; equipment, tools, and materials needed to perform the work activities; potential safety hazards which may be encountered and safe work procedures to be followed; personal protective equipment needed; crew suggestions for improved performance, efficiency, and/or safety.
8. Conduct a daily pre-work meeting prior to the beginning of work activities each day to be headed by the supervisor with all employees taking part. The daily pre-work meeting should consist of the supervisor briefly discussing each of the items of the Work Activities Form, with all employees signing the bottom of the sheet at the conclusion of the meeting to signify that they were present and understood what was discussed.
9. Devise a Pre-project Checklist to be completed prior to beginning a project. The checklist would organize items to be completed by the company and ensure that the company either owns, has access to, or makes arrangements to rent the equipment necessary to safely perform tasks throughout the construction process.
10. Develop Work Plans for all major work activities which the company performs in order to have a written record of the steps to be taken for completing significant operations with in the construction process.
11. Create a Safety Compliance Audit Sheet for the operations of XYZ Construction. The sheet should include the location of the project, the name of the person conducting the audit, and the date the audit is being performed, a list specific

items that relate to tasks performed by employees, a checklist area depicting whether or not the company was in compliance, the corrective action(s) to be taken if not in compliance, and the date any non-compliance items were corrected.

12. Perform Safety Compliance Audits to ensure that safe work practices and procedures are being followed by employees. The supervisor of the project or other company representative should conduct audits, inform employees of their findings, ensure corrective action is taken if needed, and then the company should keep a written copy of the audit for their records.

These recommendations are aimed at the prevention of employee injuries from falls at XYZ Construction. While the implementation of these recommendations will not eliminate the possibility of an employee incurring a fall or an employee sustaining an injury as a result of a fall, the implementation of these recommendations is likely to increase employee awareness of falls, identification of fall hazards on the jobsite, and an understanding of control measures to prevent falls.

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APPENDICES

Appendix A – Questionnaire to Production Employees

The following questions are applicable to safe work practices and procedures regarding fall protection in the construction industry. Please CIRCLE the correct answer to each question. There is only ONE correct answer for each question.

1. The fall protection standard for construction covers anyone who works _____ feet above the ground or above dangerous equipment.
A. four B. six C. eight D. ten
2. The height of the top rail of a guardrail system must be _____ inches, plus or minus 3 inches from the walking/working level.
A. 36 B. 39 C. 42 D. 45
3. Toeboards must be at least _____ inches high.
A. 2 ½ B. 3 ½ C. 4 ½ D. 5 ½
4. Covers must be color coded or marked with the word “_____” or “COVER” to provide warning of the hazard.
A. HAZARD B. STEP C. CAUTION D. HOLE
5. Covers must be capable of supporting at least _____ times the weight of workers, equipment, and materials that could be placed on the cover at any given time.
A. 1.5 B. 2 C. 2.5 D. 3
6. All covers must be secured when installed so as to prevent accidental removal by _____.
A. wind B. equipment C. employees D. A, B, and C
7. During the performance of roofing work, materials and equipment should not be stored within _____ feet of a roof edge unless guardrails are in place at the edge.
A. two B. four C. six D. eight
8. A stairway or ladder should be provided at all points of access where there is a break in elevation of _____ inches or more.
A. 12 B. 16 C. 19 D. 24
9. Ladders should extend at least _____ feet above the access level or landing platform.
A. two B. three C. four D. five
10. Angle a ladder so that the distance from the bottom of the ladder to the structure equals _____ the ladder's working length.
A. 1/2 B. 1/3 C. 1/4 D. 1/5

11. When using planking for scaffolding purposes, the front edge of the planking should not be more than ____ inches from the structure.
A. 8 B. 10 C. 12 D. 14
12. Each end of a plank, unless cleated or otherwise restrained, should extend over the center of the support at least ____ inches.
A. 3 B. 6 C. 9 D. 12
13. Each plank 10 feet or less in length should not extend over its support more than ____ inches.
A. 6 B. 9 C. 12 D. 15
14. Each plank greater than 10 feet in length should not extend over its support more than ____ inches.
A. 9 B. 12 C. 15 D. 18
15. On scaffolds where planks are overlapped to create a long platform, the overlap should occur only over supports, and the overlap should not be less than ____ inches unless the planks are nailed together or otherwise restrained from moving.
A. 12 B. 15 C. 18 D. 24
16. Scaffolds and their components should be inspected for visible defects by a competent person ____ each work shift and after any occurrence which could affect the scaffold's structural integrity.
A. before B. during C. after D. throughout
17. Employees shall not work on scaffolds covered with ____, except as necessary for removal of such material(s).
A. snow B. ice C. slippery material D. A, B, and C
18. Poles for "pump jack scaffolds" should be secured to the structure by triangular bracing or equivalent at the ____ and other points as necessary.
A. top and bottom B. top C. midpoint D. bottom
19. Planking used with "ladder jack scaffolds" should not exceed a height of ____ feet.
A. 18 B. 20 C. 22 D. 25
20. Maintain a minimum distance of at least ____ feet between any part of an aerial lift and an electrical line.
A. 5 B. 10 C. 15 D. 20

Once you have answered each question, please return this sheet to the researcher. Thank you.

Appendix B – Questionnaire to Supervisor

Supervisor Questions

If you need additional space to answer any of the questions, please use the back of this sheet.

1. Are pre-planning activities regarding fall protection conducted, whether it be pre-bid, pre-construction, weekly, daily, etc? (circle one) YES NO

If you answered YES, please explain in detail all pre-planning activities regarding fall protection.

2. Is fall protection training provided to employees? (circle one) YES NO

If you answered YES, describe the training.
